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White Paper for
NASA Strategic Roadmaps
"Exploration of the dynamic Earth system"

Practical Application Teams for Earth Science NASA missions.

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NASA missions within Earth Science programs and projects (Geo-scientific Research and Applications program; Terra (EOS); Ice, Clouds, and Land Elevation Satellite (ICESat), LANDSAT 7; Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observations (CALIPSO); Landsat Data Continuity Mission (LDCM)) can bring a lot of important data for GIS market and commercial users. Multi-spectral imagery, InSAR and LIDAR data have great commercial potential. Typical characteristics of such projects are: a. large volume of data; b. complex algorithms for processing satellite information; c. high variability of user's goals. Scientists at the Greenwich Institute believe that NASA's Earth Sciences projects and missions must include Practical Applications Teams for service for non-scientific users and for search of additional practical applications of NASA data.

Scientists at the Greenwich Institute for Science and Technology developed advanced, scalable methods for processing imagery, LIDAR and InSAR data, generation of high-quality digital terrain models, automated extraction and 3D-modeling of various features, including bodies of water and foliage, buildings and roads. These methods cover raw data processing, pixel identification, object extraction and classification, polyline generation and automatic comparison of images. Novel Virtual Surfaces Method/Model for generation and representation of terrain models was developed and tested during several projects for processing ~ terabyte volume of LIDAR/InSAR data and DTM generation in area of ~25,000 sq.km [1-4].

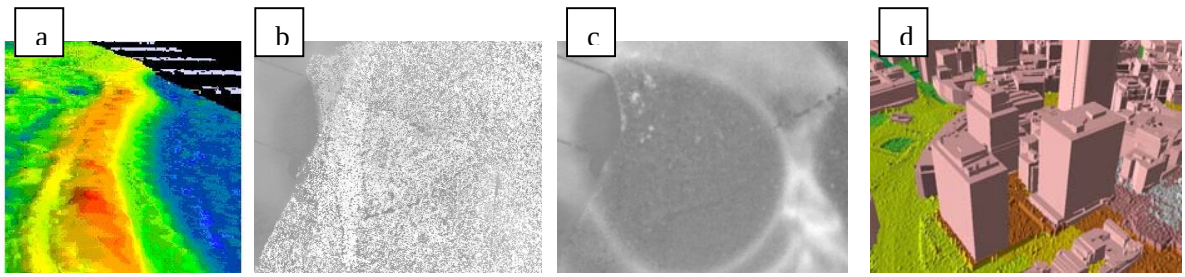

Figure 1. Samples from geospatial projects of the Greenwich Institute Team:
a: 3-D-model of sand dunes and shoreline in Puerto-Rico using vegetation removal techniques within Virtual Surfaces Method (NASA LIDAR data, 4–m pixel).
b. MD/DNR LIDAR data (2-m pixel) for heavily forested area in E.Maryland, 0.5x0.7 km.
c: Data of **Fig 1b** after our VSM-filtering shows complex relief with large depression.
d: Automatically generated 3D-model of Boston using 1-m pixel MassGIS LIDAR data.

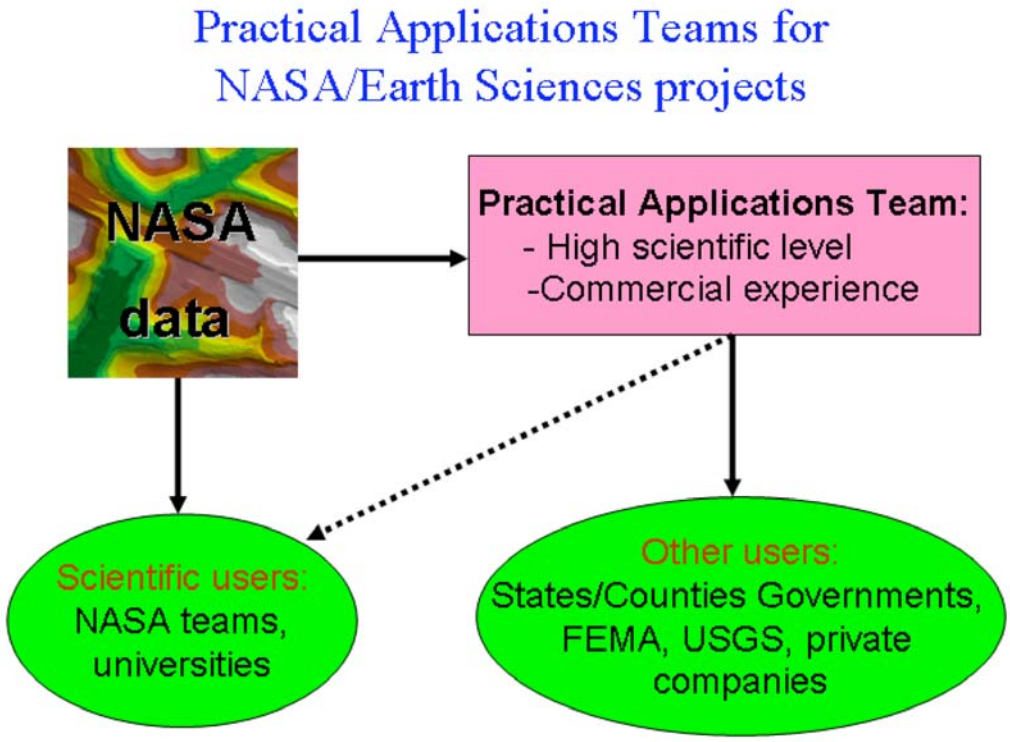

Figure 2. Each NASA Earth science project, which has potential non-scientific customers (different levels Governments or commercial companies), can include the Practical Application Team (PAT) with scientific and commercial experience. Practical Application Teams will work on commercial base (NASA data can be free, but PAT service is not free. Cost of service for processing large database is close to 1/3 from cost of data, according current standards of GIS/LIDAR industry).

Benefits from organization of Practical Applications Teams (PAT) include**:**

- additional interests to NASA projects from other agencies and public;
- financial support of NASA projects (as part of income from PAT service);
- long and useful life of satellites data from Earth Science NASA projects.

This scheme approved well in GIS and LIDAR industry. We have positive experience of organization of similar Practical Applications Team, which include Greenwich Institute for Science and Technology, General Dynamics Armament and Technical Products and Dewberry, LLC (official FEMA permanent contractor) for service of non-scientific customers (list of such customers in Fig.2 presents names of our real customers) in area processing LIDAR and imagery data from NASA and other vendors.

References.

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